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ABSTRACT

This study was undertaken to illustrate the application of a multidimensional individual-differences approach to credibility judgments as an alternative to factor analysis. Judgments of aspirants to the presidency of the United States were specifically studied. Ten stimulus-persons, varying in sex, political affiliation, and (apparent) ideology, were selected from the set of known aspirants to the presidency as of February 1972. Seventy undergraduates at the University of Illinois at Urbana participated in the study. It was found that credibility data for the group were best represented by a three-dimensional space with factors reflecting (1) the honesty of an aspirant as a function of his political ideology, (2) the seriousness of a candidate's aspirations, and (3) the candidate's television image. The competency of aspirants did not appear to be a factor in assessment. Four viewpoint factors were extracted from the subjects by a credibility ratings matrix, and credibility configurations were obtained for subjects loading highly on each viewpoint. The configurations for the subject clusters were found to vary in nature and number of dimensions. (Author/LG)

Credibility and Individual Differences: an Alternative to Factor Analysis

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Research efforts to reconstruct the evaluative structure underlying the source-credibility judgment have typically employed the factor analytic technique: extraction of the largest eigenroots of a correlation matrix, conversion of the associated eigenvectors to the factor pattern, and rotation of the resulting configuration to some position in multivariate space suitable for psychological interpretation. This particular approach to uncovering the dependence structure of a multinormal population has its limitations: while we may reduce our original n-dimensional space of vectors (unidimensional construct ratings on semantic differential scales) to a space spanned by only m vectors, we have no reason to assume that the bipolar scales constitute an adequate sample of the domain of adjectives or criteria relevant to judgments of credibility. Consequently, the results of such analyses can be regarded only as concise accounts of consistent covariation in responses to subsets of the original scales: they may or may not have to do with evaluative structure.

This is made clear through comparison of the factor analytic study of Berlo and Lemert (1961) to the work of Bowers and Phillips (1967) and McCroskey (1966). In the former study, the original set of responses to bipolar scales were reduced to a three-dimensional subspace spanned by vectors labeled "competence", "trustworthiness", and "dynamism", while the

Bowers and Phillips and McCroskey efforts uncovered only the "competence" and "trustworthiness" dimensions.[1] That the decision of the latter experimenters was to omit scales which Berlo and Lemert found to load highly on a third dimension, e.g., "aggressive/meek", "bold/timid", appears to account for the recovery of a structure of only two dimensions.

Given a bit more flexibility in the application of the factor analytic technique, such arbitrary structures may be eliminated. There is no reason save custom to confine ourselves to the correlation matrix as input to factor analysis: non-negative eigenvalues and potentially interpretable eigenvectors may be extracted from any positive, semi-definite matrix whose cell entries are measures of association among stimulus-pairs. By obtaining simple measures of psychological distance or dissimilarity on pairs of stimuli (sources) with respect to their comparative credibility, a space may be generated defined not by the experimenter's rating scales but by the undirected perceptions of the subjects. In this manner we obtain, implicitly, an adequate sampling of each subject's "domain of adjectives" relevant to the credibility judgment. The technique described is basically that of multidimensional scaling, wherein a matrix derived from dissimilarity estimates on all pairs of stimuli is multiplied by its transpose and the resulting scalar products matrix is factored.

With the exception of the work by Siegel, Miller, and Wotring (1969) on "credibility proneness," there has been no systematic effort to approach the credibility construct from the point of view of individual differences. In both factor analysis and simple space multidimensional scale analysis

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[1] McCroskey refers to these two factors as "authoritativeness" and "character".

the account of the structure of the credibility judgment will obviously derive from group averages on the raw data. It is not improbable that the responses of the "average subject" will prove unrepresentative of any subject in the sample from which the data is obtained.

It may be possible to isolate distinct "points of view" about credibility: that is, to determine that there is not consistent covariation among subjects with respect to their credibility assessments. This amounts to performing a Q-type analysis on a subjects by credibility ratings matrix. Given that such points of view could be isolated by principal components, we may then proceed to derive a separate space for each cluster: we may determine the nature and number of dimensions underlying the credibility judgment specific to a point of view.

The present study was undertaken to illustrate the application of a multidimensional individual differences approach to credibility judgments: specifically, judgments of aspirants to the Presidency. Methodologically imperative were: (1) a procedure for collection of credibility responses to stimulus-persons (message sources) independent of the arbitrary selection of rating scales; (2) a technique for data reduction from which both a superstructure of individual perceptual "types" and a description of the structure of evaluative criteria underlying such types could emerge; (3) a means for comparing individual and group spaces.

To satisfy these imperatives, it was proposed to obtain dissimilarity estimates of all possible pairs of a set of stimulus-persons with respect to their comparative credibility, and to submit such estimates to multidimensional scale analysis by Tucker-Messick POINTS-OF-VIEW analysis, a fully metric program for the isolation of consistent individual viewpoints from

group dissimilarity estimates, and TORSCA-9, a nonmetric program for the derivation of group perceptual spaces from rank-ordered dissimilarity estimates.

Method

Selection of stimulus-persons: Ten stimulus-persons were selected from the set of known aspirants to the Presidency as of February, 1972. The number of stimulus-persons was set at ten as best satisfying certain methodological criteria: (1) that the number of paired-comparison dissimilarity estimates be kept to a minimum; (2) that there be at least three times as many stimuli to be scaled as the number of dimensions believed necessary to account adequately for their interrelationships;[2] (3) that the measure of "fit" of the scaling solutions to the dissimilarities data not be spuriously enhanced by too few stimuli. The measure of goodness-of-monotonic-fit of scaling solution to dissimilarities data in nonmetric scaling is "stress", a sort of residual variance estimate which is sensitive to a small number of points (stimuli). Although a stress value of .05 or less might be taken as indicative of a good fit for ten stimuli in three dimensions, with as few as eight stimuli, three-dimensional configurations for randomly- generated sets of data will obtain a stress of $\leq .05$ about three times out of ten. Such a probability is close to zero for ten points in three dimensions (Klahr, 1969).

The ten stimulus-persons, selected to vary as to sex, political affiliation, and (apparent) ideology, were: Shirley Chisholm, Henry Jackson,

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[2] On the basis of the Berlo and Lemert findings, three dimensions were posited.

Hubert Humphrey, John Lindsay, Richard Nixon, Eugene McCarthy, George McGovern, Edmund Muskie, Pat Paulsen, and George Wallace.

Data collection procedures: Subjects were 48 male and 22 female undergraduates at the University of Illinois at Urbana-Champaign, enrolled in introductory courses in interpersonal and verbal communication. They were informed that they were to participate in a study of the "credibility gap", and that the experimenter was interested in how they ranked the current crop of Presidential aspirants in terms of their comparative credibility. Subjects were presented with all $\frac{n(n-1)}{2}$ pairs of stimulus-persons, and asked to rate each pair on a scale ranging from "0" ("identical") to "100" ("as dissimilar as you can imagine") as to their dissimilarity with respect to "credibility as the source of a political message." Subjects were also asked to list their political affiliation, if any, and the set of attributes or criteria they used in making their dissimilarity estimates.

Analysis of Data: Of the 70 subjects, 16 indicated their political preference as Democrat, 8 as Republican, 41 as Independent, while 5 Ss indicated no preference.

Dissimilarity estimates[3] for each stimulus-person pair were summed across all subjects, and the resulting sums were reduced to ordinal level: a half-matrix of dissimilarities was constructed in which the most similar pair was assigned the rank "1", and the least similar pair the rank "45". The ranked dissimilarities were input to TORSCA-9. Configurations of the stimuli

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[3]The reliability coefficient for the dissimilarity ratings was estimated with KR20 to be equal to .887 (Magnusson, 1966).

were obtained in three-, two-, and one- dimensional accounts, in separate scalings with the familiar Euclidean metric of factor analysis and the Householder-Landahl city block metric.[4] The Euclidean configurations were rotated to the Varimax criterion.

Table I gives the obtained values of stress for the Euclidean and city block representations of the data, in one, two, and three dimensions. The cutoff value of stress was set at .05. Only the three-dimensional solutions provided satisfactory monotonic fit to the original dissimilarities: the Euclidean configuration departed somewhat less far from perfect monotonicity than did the city block solution.

Table II gives the Varimax rotated configuration for the three-dimensional Euclidean solution: the two-dimensional plots of the configuration are given in Figure 1 (a) (b) (c).

To determine the percent of variance accounted for by each dimension, the matrix of scale values for the three-dimensional solution was multiplied by its transpose, and the scalar products matrix thus obtained was submitted to principal components analysis. Dimension I accounted for 48.34% of the variance, Dimension II for 38.75%, and Dimension III for 12.91%.

Judgmental criteria obtained from the subjects were used to label the dimensions.[5] The most frequently listed criterion was "honesty": other criteria in descending order of frequency were "television image", "stand on the issues", "conservative/liberal", "party membership", and "seriousness

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[4]Under the city block metric, the distance between two points or stimuli is the sum of the absolute difference of their coordinates on each dimension. City block distance is not invariant under rotation.

[5]All labels derived in such a fashion are tentative: they may be verified in follow-up studies by attempting to fit outside property vectors (unidimensional construct ratings on such scales as "honest/dishonest") to the derived stimulus space.

of aspirations". None of the 70 subjects indicated that the comparative "competency" of sources influenced his judgments.

Although Dimension I, with Wallace and McCarthy at its opposite bounds, would appear clearly to reflect the ideological spectrum, it is probable that a sample of college students would view the trustworthiness of a source as a function of his political ideology.

Dimension II, bounded by Pat Paulsen and Richard Nixon, has tentatively been labeled "seriousness of aspiration". Although Dimension III is subject to a variety of interpretations, it may well be a factor not unlike dynamism: a bipolar factor reflecting television image. In McLuhan's terms, the "cool", urbane Lindsay is contrasted to the "hot", "speeded-up" image of Wallace.

As the second stage in analysis, dissimilarities judgments of the total sample were submitted to the Tucker-Messick POINTS-OF-VIEW program. A preliminary components analysis had been performed on the product of the raw dissimilarities matrix (subjects by credibility ratings) and its transpose, yielding five "subject factors" which accounted for more than one percent of the variance. POINTS-OF-VIEW determined the scaled projections both of stimulus-pairs and of individuals on the five factors.

Viewpoint I accounted for 84.06% of the variance. POINTS-OF-VIEW requires data referred to a rational origin: frequently a large initial factor will be indicative not of a clique of subjects with congruent perceptions, but rather of variation in scale origin and unit. The remaining viewpoints, however, can be taken to reflect genuine subject factors. Of those viewpoints that may be accepted without hesitation, viewpoint II accounted for 1.92% of the variance, viewpoint III 1.36%, viewpoint IV 1.15%, and viewpoint V 1.09%.

The remaining 10.42% of the variance was shared by 40 other factors.

To determine the nature and number of dimensions peculiar to the credibility judgments representative of each point-of-view, separate TORSCA-9 runs were performed on the dissimilarities data of groups of Ss loading highly on each viewpoint: cutoff point for loadings was 500.[6] Scalings were performed under the Euclidean metric in four, three, two, and one dimensions. Cutoff values of stress were set at .05 for a three-dimensional solution and at .03 for a four-dimensional solution.[7]

Six of the seven subjects with large projections on viewpoint II indicated that they were ignorant of some of the stimulus-persons, and had done a great deal of guessing: the expectation would be that their data would not be well fit in only three dimensions, and that the dimensions of judgment in any solution would be difficult to interpret.

As expected, a dimensionality greater than three was necessary to fit the data of viewpoint II subjects: a good monotonic fit was achieved in four dimensions, with a stress value of .024. Dimension I accounted for 48.34% of the variance, Dimension II for 25.14%, Dimension III for 16.58%, and Dimension IV for 9.94%.

Table III gives the Varimax rotated configuration for the viewpoint II subjects, and Figure 2 (a) (b) (c) (d) (e) (f) the two-dimensional plots of

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[6]Scaled projections of individuals on the principal factors of X (the raw subjects by ratings matrix) may be of atypical magnitude: prior to conversation to the factor pattern the projections of individuals on the unit length vectors of X are scaled by premultiplication by the square root of the sample size.

[7]The chances of obtaining a value of stress as low as .03 in four dimensions for randomly-generated data are about one in twenty (Klahr, 1969).

the configuration. While this configuration is the most closely related of the four viewpoint solutions to the group map (Table IV [a]), what appear to be random placements of the less well-known aspirants Jackson, Paulsen, and Chisholm prohibit straightforward interpretation. Dimension I may reflect the ideological spectrum, yet it is difficult to conceive that these subjects perceived Paulsen as more rightist than Wallace. Dimension II may represent seriousness of aspiration, although, again, it is improbable that Paulsen is viewed as more serious than Humphrey and Wallace. While Dimensions III and IV are necessary to provide a good fit to the original data, no case can be made that they "mean" anything.

Of the nine subjects who loaded highly on viewpoint III, six were female. Four of the subjects indicated that the political affiliation of the stimulus-person influenced their credibility assessments, while the others gave reasons varying from "visibility" to "poise in public".

A three-dimensional solution was adequate to account for the dissimilarity judgments of viewpoint III subjects: the value of stress was .043. Dimension I accounted for 50.78% of the variance, Dimension II for 30.24%, and Dimension III for 18.98%. Table V gives the Varimax rotated configuration of viewpoint III credibility assessments, and Figure 3 (a) (b) (c) the two-dimensional plots of the configuration. Dimensional intercorrelations between the viewpoint III space and the group space are negligible (Table IV [b]).

Seriousness of a candidate's aspirations appears to have been the primary criterion of judgment for viewpoint III subjects: Dimension I is bounded by Shirley Chisholm and Richard Nixon. Dimension II has been tentatively labeled "obscurity": Jackson loaded highly on this dimension alone, while the well known aspirants Humphrey and Lindsay had large negative loadings. Dimension

III may reflect traditional two-party politics: Democratic faithful Muskie loads highly while former third-party candidates McCarthy and Wallace have the largest negative projections on the dimension.

All of the five subjects with large projections on viewpoint IV indicated that their judgments of credibility were based upon aspirants' stands "on the issues", especially civil rights and the war in Indochina. These subjects tended to make exceptionally large estimates of dissimilarity: they might well be described as "credibility prone".

A four-dimensional solution was needed to account for the credibility data of viewpoint IV subjects: the value of stress was .030. Table VI gives the Varimax rotated configuration and Figure 4 (a) (b) (c) (d) (e) (f) the two-dimensional plots of the configuration. Dimension I accounted for 45.74% of the variance, Dimension II for 26.50%, Dimension III for 16.01%, and Dimension IV for 11.75%. Table IV (c) gives the interdimensional correlations of the viewpoint IV subject space and the group space: Dimension I of the former is significantly correlated with the first dimension of the group configuration.

The first dimension is clearly reflective of the ideological spectrum, from the right, with Wallace, to the left, with McGovern. With the exception of Chisholm, most of the candidates had negligible loadings on Dimension II: it may be interpreted as indicative of viewpoint IV subjects' tendency to exaggerate her difference from all other aspirants, probably because she is both Black and female. Dimension III may be interpreted as a hawk/dove factor. Dimension IV, on which Nixon and Humphrey have moderately high positive loadings in contrast to the negative projections of Chisholm and Paulsen, appears to reflect seriousness of aspiration.

Of the eight subjects who loaded highly on viewpoint V, four indicated that their judgments were based upon impressions or images of the candidates projected by the mass media. The remaining subjects did not list their judgmental criteria.

A four-dimensional solution was required to account for the data of viewpoint V subjects: the value of stress was .027. The Varimax rotated configuration is given in Table VII, and the two-dimensional plots of the configuration in Figure 5 (a) (b) (c) (d) (e) (f). Dimension I accounted for 45.04% of the variance, Dimension II for 30.19%, Dimension III for 13.31%, and Dimension IV for 11.46%. The viewpoint V solution is not significantly related to the group configuration (Table IV [d]).

Dimension I clearly reflects seriousness of aspiration, while Dimension II may be interpreted as similar to the media image dimension found in the group configuration. No reasonable interpretation could be made for Dimension III, other than it serves to take up slack in the fit. Dimension IV serves chiefly to describe Paulsen, who is contrasted with Humphrey and Wallace. We may refer again here to the media image: the bumbling and inarticulate comedian at one extreme, the garrulous politician at the other.

Discussion

The evaluative structures derived from both group and viewpoint dissimilarities estimates were clearly multidimensional: in no case did the contribution of the initial dimension to total variance fall below 45%, nor did that of the second dimension fall below 25%. However, in every case the eigenroots corresponding to the third and fourth dimensions were less than

unity. It would appear that in the case of the Presidential aspirant, overall credibility assessments are largely a function of responses along two dimensions, "ideology" and "seriousness of aspiration," even though under the Euclidean metric three or more dimensions are required to represent the data adequately.

While the equation for Euclidean distance is of the quadratic form, the function has an analogue in linear compensatory predictive models. Euclidean distance is a function of the weighted difference in coordinates of stimuli on dimensions. The size of the weights contributed by each dimensional difference depends upon the percentage of variance in the interpoint distance matrix accounted for by each dimension: in general, coordinate loadings will be larger on those dimensions accounting for largest proportions of variance. Similarly, in a linear predictive model such as a regression equation, the larger weights will be on those variates which account for maximum variation in the criterion variable. A Euclidean space may not be the most suitable choice for the representation of credibility judgments of Presidential aspirants: there is evidence that evaluations of political candidates are best predicted by noncompensatory combinations of their multiple attributes (Einhorn, Komorita, and Rosen, 1972).

That there are differing perspectives on credibility is clear: distinctive clusters of subjects were found with evaluative structures varying both in nature and number of dimensions. Although in one case structural deviation from the group map may have been sex-related, generally the cliques derived from POINTS-OF-VIEW analysis reflect quantitative differences in information about the stimulus-persons, and variation in the attributes viewed as primary determinants of an aspirant's credibility.

TABLE I.

Obtained Values of Stress for Euclidean and City Block Representations of the Group Dissimilarities Data: One, Two, and Three Dimensions.

Dimensionality	Metric	
	Euclidean	City Block
1	.299	.272
2	.074	.091
3	.035	.062

TABLE II.

Varimax Rotated Configuration for Group Dissimilarities Data: Three-Dimensional Euclidean Solution.

STIMULI	DIMENSIONS		
	I	II	III
Chisholm	-.429	.466	.084
Humphrey	-.070	-.248	-.122
Jackson	.098	-.125	.545
Lindsay	-.161	-.149	-.503
McCarthy	-.476	.065	-.196
McGovern	-.392	-.037	-.045
Muskie	-.261	-.252	-.072
Nixon	.236	-.742	.168
Paulsen	.571	.907	-.271
Wallace	.886	.116	.409

FIGURE I. (a) (b) (c)

Two-dimensional Plots of
Varimax Rotated Configuration
for Group Dissimilarities.

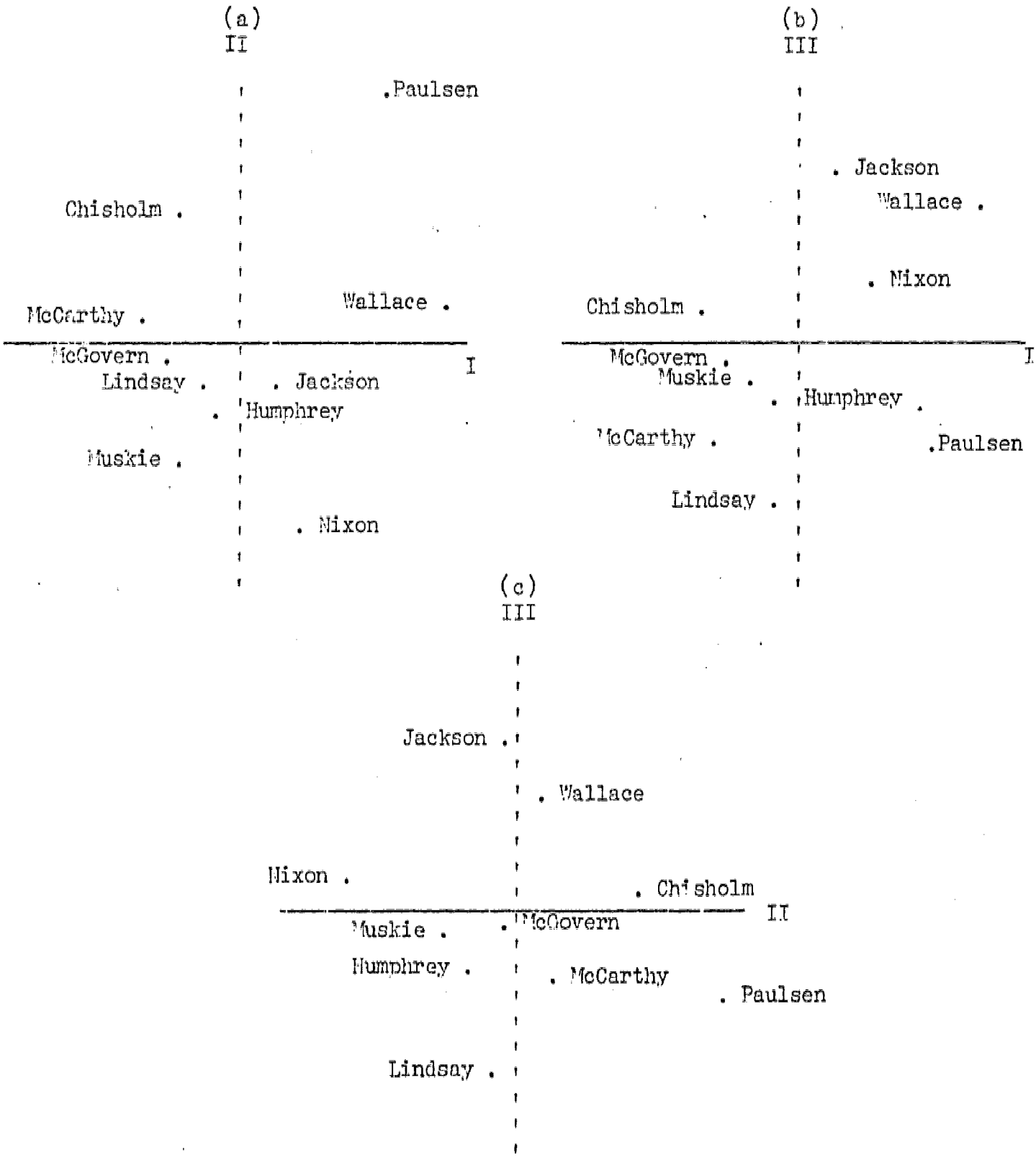


TABLE III.

Varimax Rotated Configuration
for Viewpoint II Subjects.

STIMULI	DIMENSIONS			
	I	II	III	IV
Chisholm	-.190	.593	.210	.196
Humphrey	-.181	.241	-.423	-.090
Jackson	-.266	-.081	.280	.475
Lindsay	-.134	-.090	-.002	-.461
McCarthy	-.032	-.177	-.565	-.044
McGovern	-.536	.004	-.017	.009
Muskie	-.237	-.324	.100	-.080
Nixon	-.142	.605	.019	.080
Paulsen	1.057	.047	.135	.202
Wallace	.662	.391	.263	-.286

FIGURE 2 (a) (b) (c) (d) (e) (f)

Two-dimensional Plots of
Varimax Rotated Configuration
for Viewpoint II Ss.

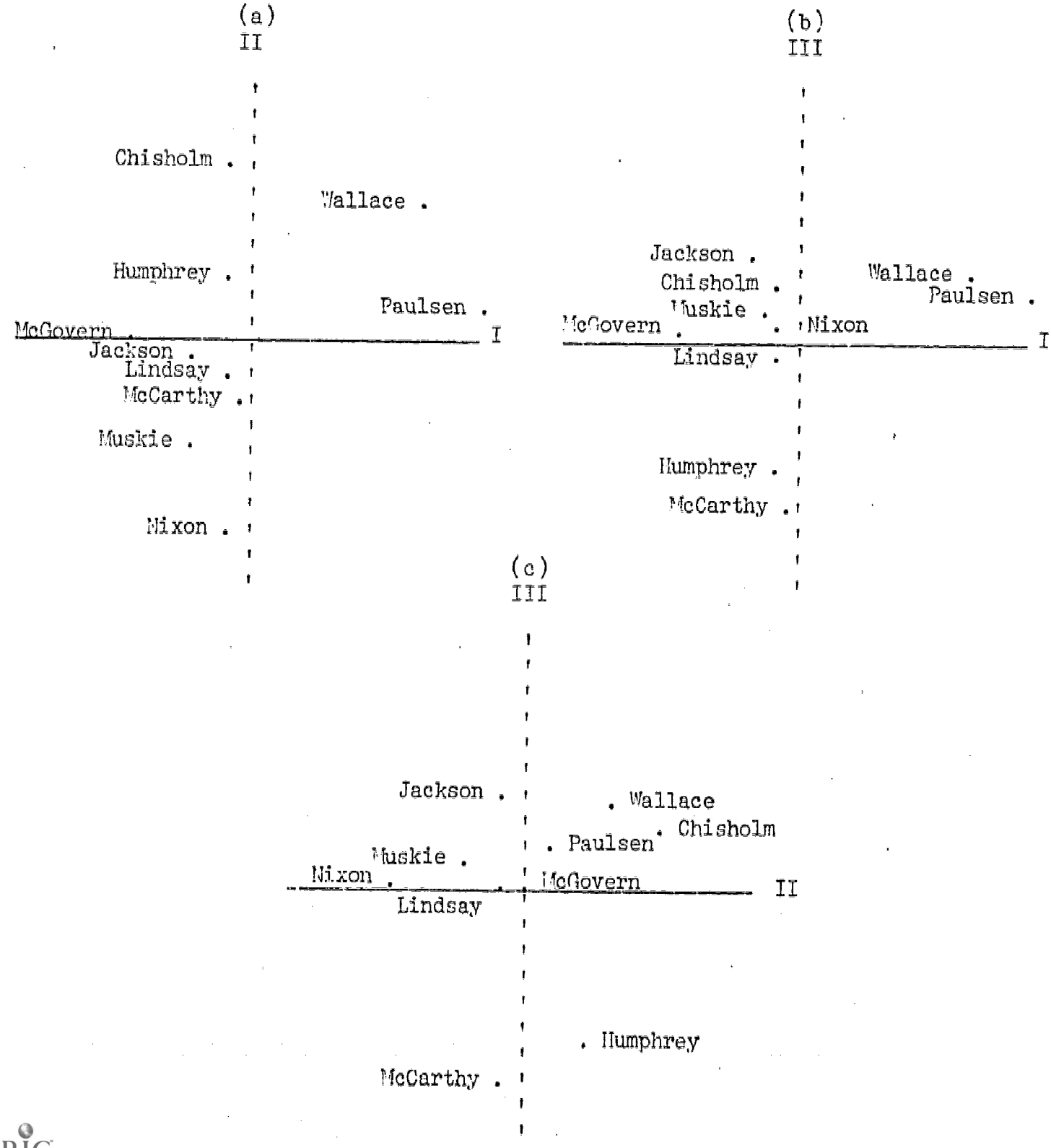


FIGURE 2

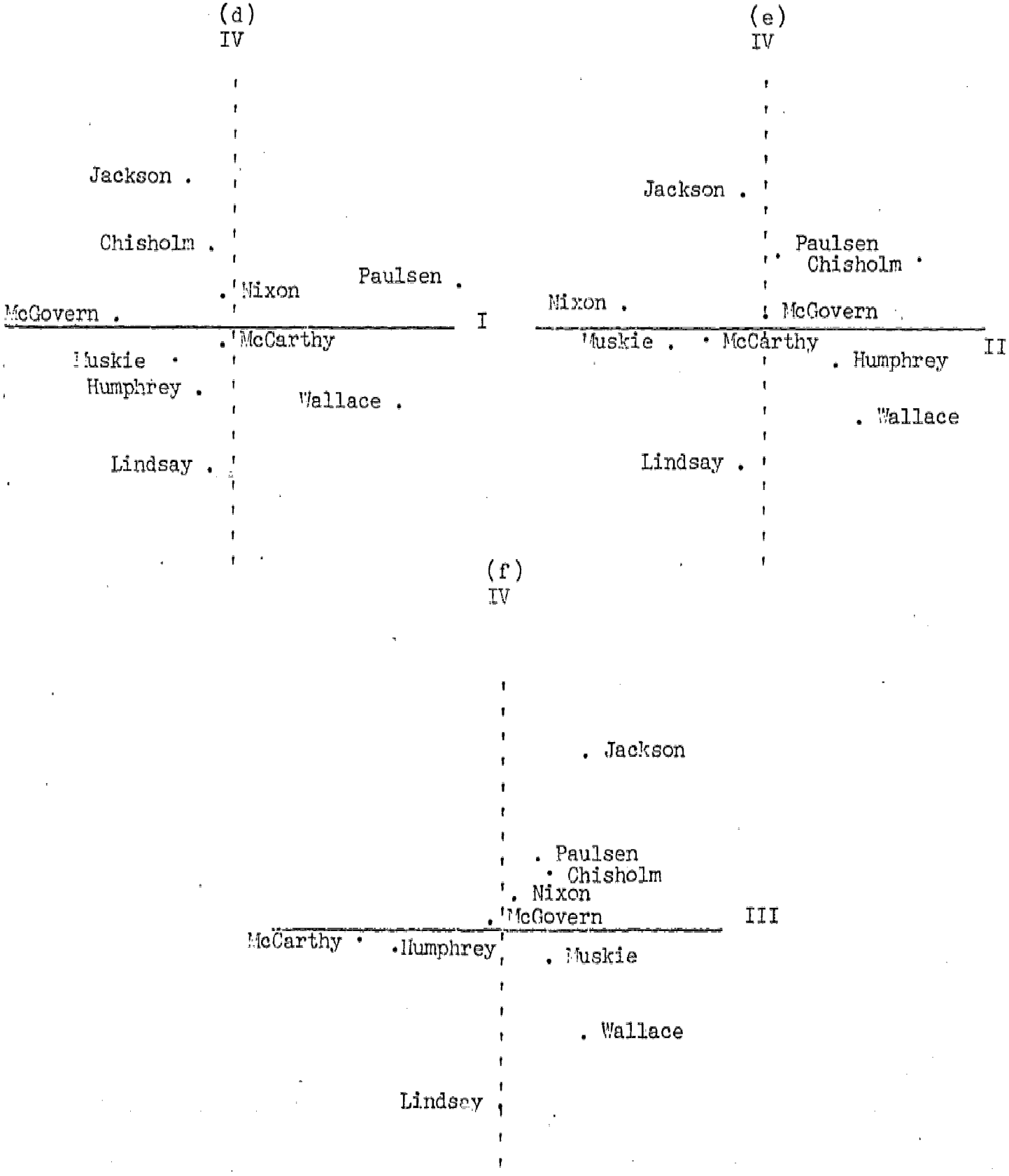

(d)
IV
Jackson
Chisholm
Paulsen
Nixon
McGovern
I
McCarthy
Muskie
Humphrey
Wallace
Lindsay
(e)
IV
Jackson
Paulsen
Chisholm
Nixon
McGovern
Muskie
McCarthy
II
Humphrey
Wallace
Lindsay
(f)
IV
Jackson
Paulsen
Chisholm
Nixon
McGovern
III
McCarthy
Humphrey
Muskie
Wallace
Lindsay

TABLE IV (a) (b)
(c) (d).

Interdimensional Correlations
of Viewpoint and Group
Configurations.

X, Y		r	r^2	t	df	p
Dimension I, Group with Dimension I,						
(a)	Viewpoint II	.784	.615	3.577	8	.005
(b)	Viewpoint III	-.007	.000	-0.019	8	....
(c)	Viewpoint IV	.778	.605	3.497	8	.005
(d)	Viewpoint V	-.047	.002	.134	8	....
Dimension II, Group with Dimension II,						
(a)	Viewpoint II	.612	.374	2.187	8	.050
(b)	Viewpoint III	.145	.021	.413	8	....
(c)	Viewpoint IV	.423	.179	1.319	8	....
(d)	Viewpoint V	-.098	.009	.279	8	....
Dimension III, Group with Dimension III,						
(a)	Viewpoint II	.503	.253	1.645	8	....
(b)	Viewpoint III	-.199	.039	.575	8	....
(c)	Viewpoint IV	.409	.167	1.266	8	....
(d)	Viewpoint V	.318	.101	.947	8	....

TABLE V.

Varimax Rotated Configuration
for Viewpoint III Subjects.

STIMULI	DIMENSIONS		
	I	II	III
Chisholm	.743	-.016	-.174
Humphrey	.071	-.670	-.152
Jackson	.310	.951	.248
Lindsay	-.057	-.402	.234
McCarthy	-.528	-.053	-.411
McGovern	.008	.103	.281
Muskie	-.104	-.023	.508
Nixon	-.857	-.035	-.035
Paulsen	.536	.124	.040
Wallace	-.122	.022	-.540

FIGURE 3 (a) (b) (c).

Two-dimensional Plots of
Varimax Rotated Configuration
for Viewpoint III Ss.

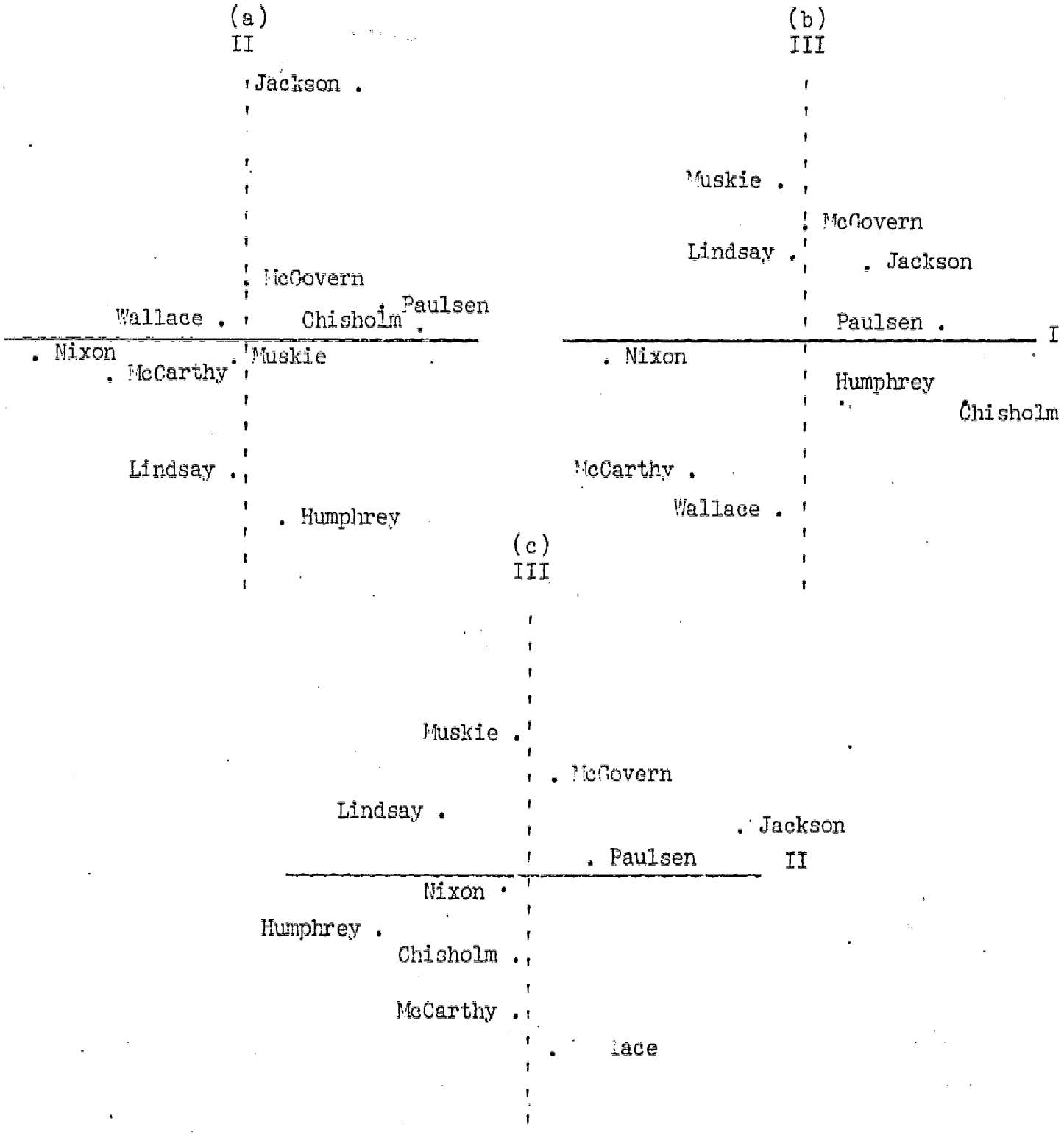


TABLE VI.

Varimax Rotated Configuration
for Viewpoint IV Subjects.

STIMULI	DIMENSIONS			
	I	II	III	IV
Chisholm	-.183	.772	-.036	-.273
Humphrey	-.247	-.127	-.212	.489
Jackson	.283	.088	-.057	.045
Lindsay	-.243	-.428	.031	-.080
McCarthy	-.086	.097	-.404	.219
McGovern	-.387	-.020	-.065	.059
Muskie	-.163	-.331	-.340	.133
Nixon	-.014	.032	.765	.258
Paulsen	-.041	.058	-.089	-.588
Wallace	1.082	-.139	.408	-.263

FIGURE 4 (a) (b) (c) (d) (e) (f)

Two-dimensional Plots of
Varimax Rotated Configuration
for Viewpoint IV Ss.

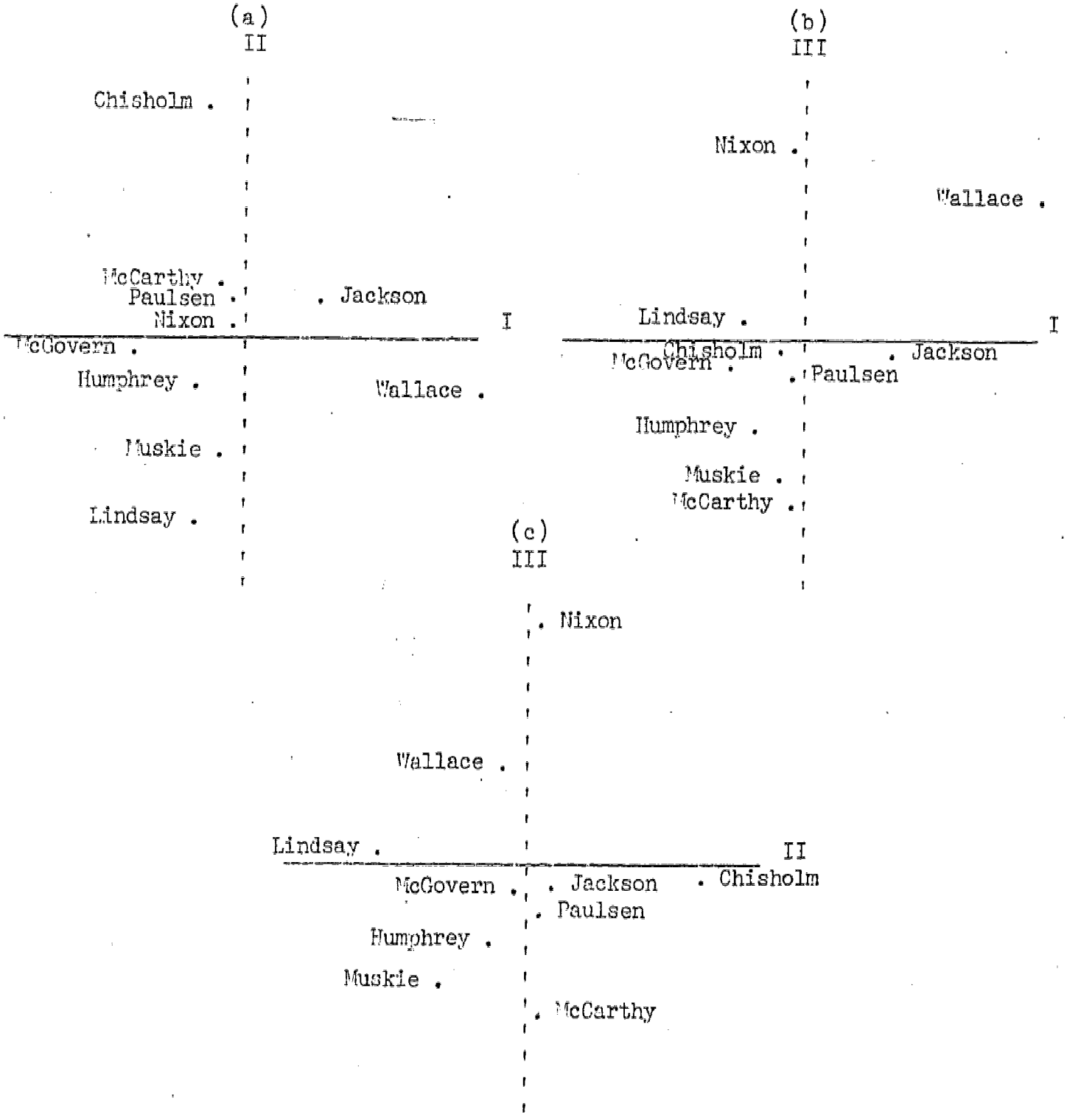


FIGURE 4

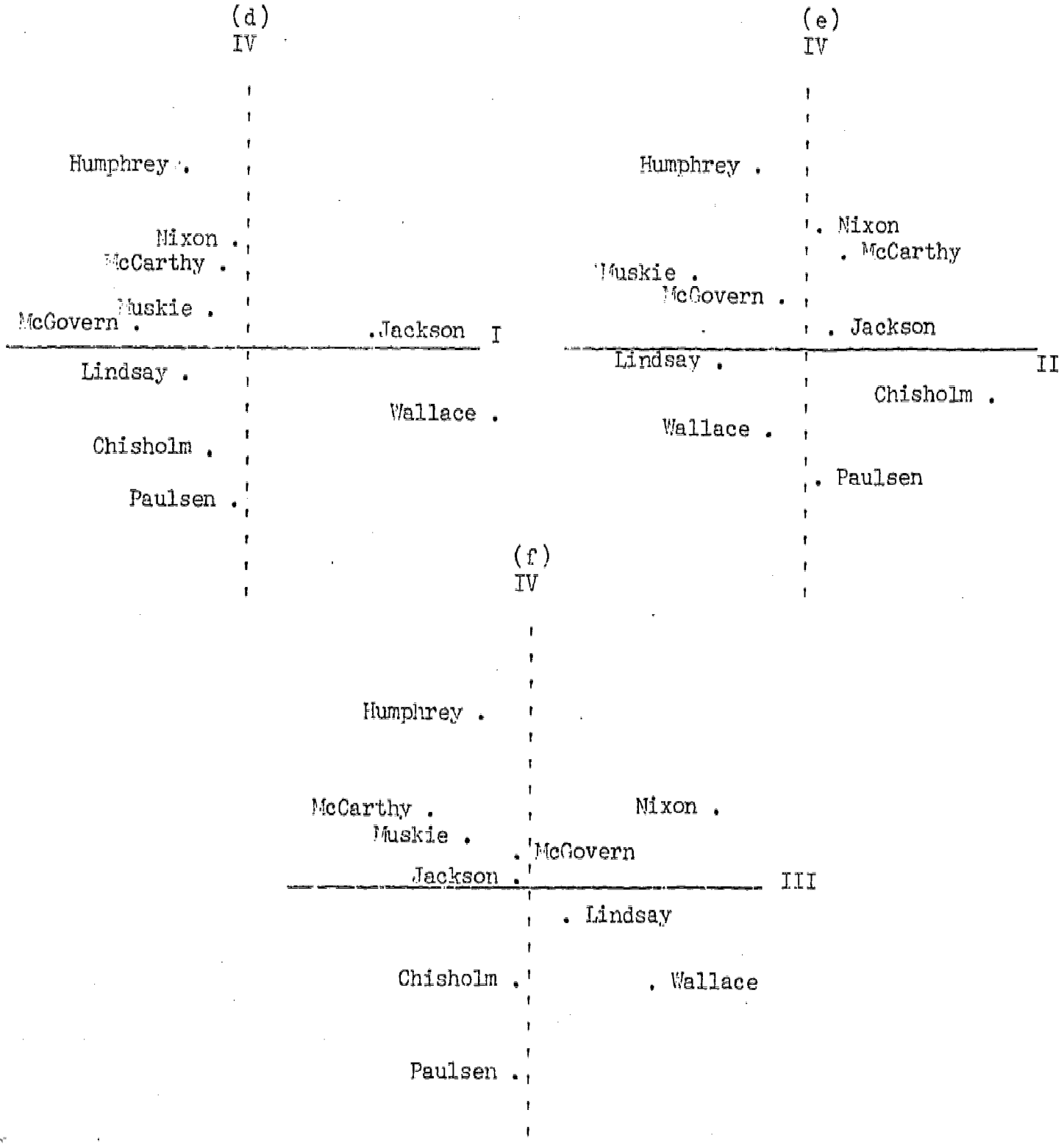

(d)
IV
Humphrey
Nixon
McCarthy
Muskie
McGovern
Jackson
I
Lindsay
Wallace
Chisholm
Paulsen
(e)
IV
Humphrey
Nixon
McCarthy
Muskie
McGovern
Jackson
II
Lindsay
Chisholm
Wallace
Paulsen
(f)
IV
Humphrey
McCarthy
Muskie
Jackson
McGovern
III
Nixon
Lindsay
Chisholm
Wallace
Paulsen

TABLE VII.

Varimax Rotated Configuration
for Viewpoint V Subjects.

STIMULI	DIMENSIONS			
	I	II	III	IV
Chisholm	.692	.060	.028	.089
Humphrey	-.067	-.023	-.105	-.508
Jackson	-.091	-.570	-.041	.111
Lindsay	-.320	.506	-.108	.203
McCarthy	-.032	.187	-.600	-.042
McGovern	.048	.012	.180	.119
Muskie	-.055	.096	.561	-.344
Nixon	-.662	.162	-.050	-.228
Paulsen	.336	.039	-.167	.974
Wallace	.151	-.470	.301	-.374

FIGURE 5 (a) (b) (c) (d) (e) (f).

Two-dimensional Plots of
Varimax Rotated Configuration
for Viewpoint V Ss.

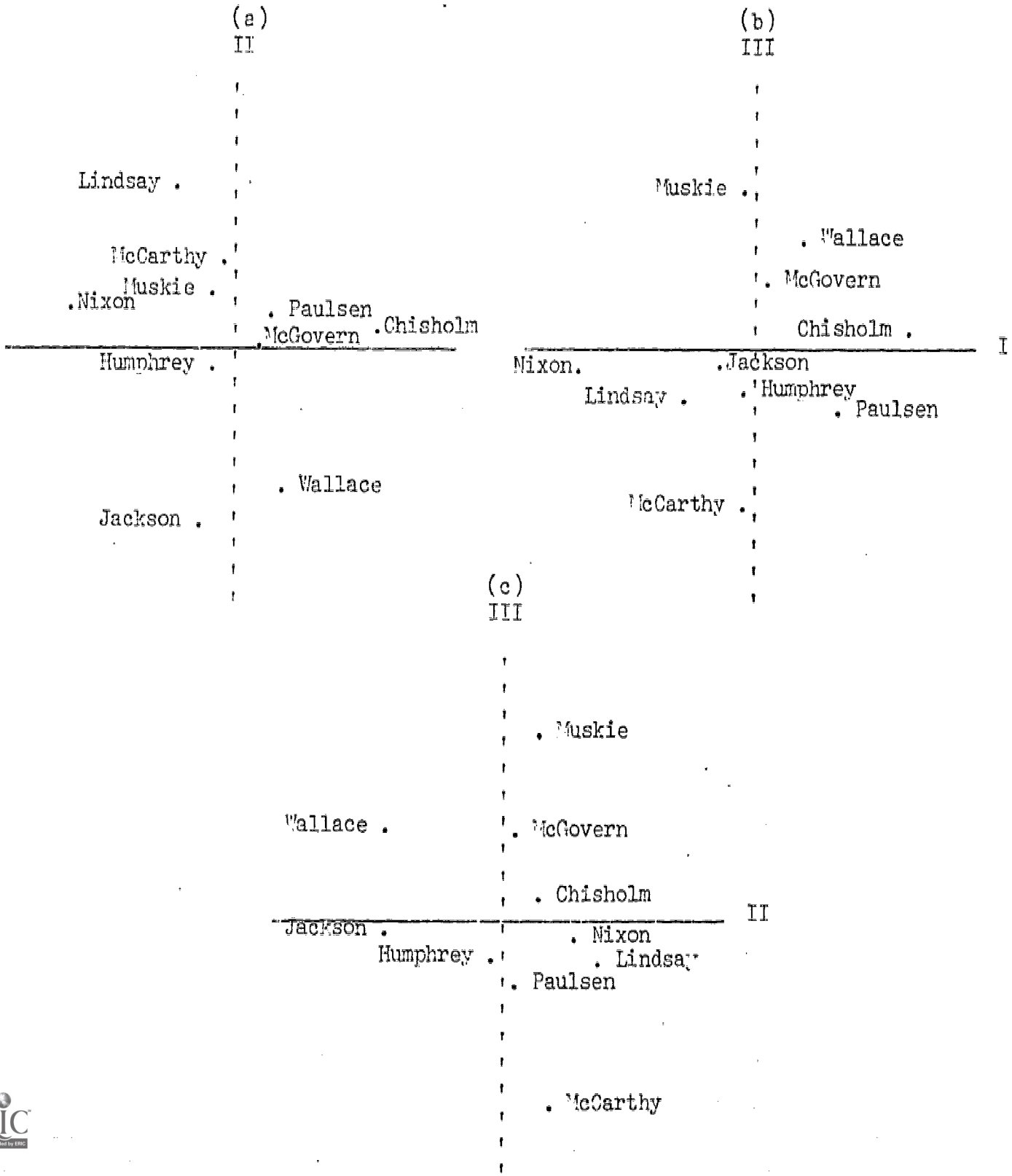
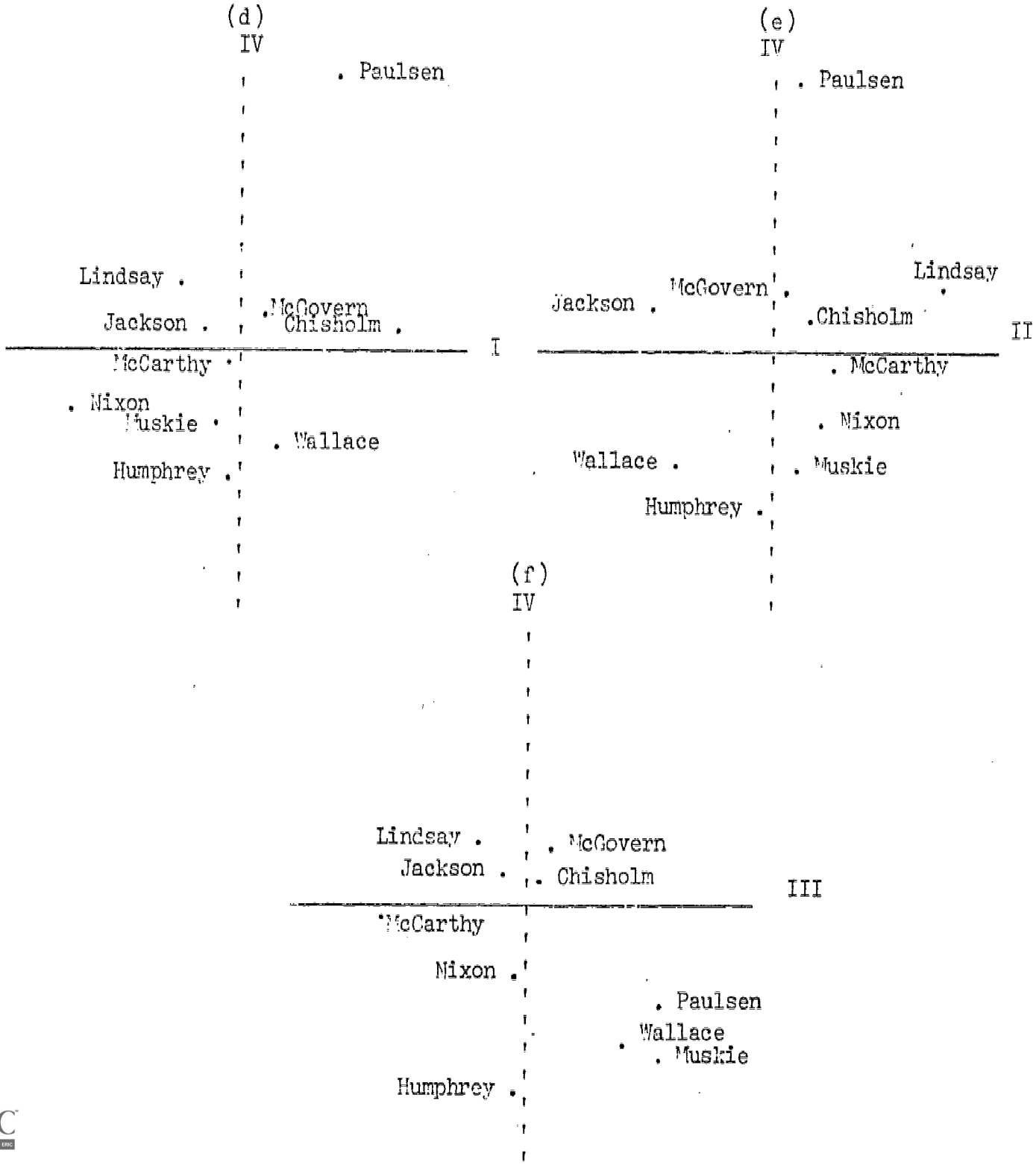


FIGURE 5


(d)
IV
Paulsen
Lindsay
McGovern
Jackson
Chisholm
McCarthy
Nixon
Muskie
Wallace
Humphrey
I
(e)
IV
Paulsen
Lindsay
McGovern
Jackson
Chisholm
II
McCarthy
Mixon
Muskie
Wallace
Humphrey
(f)
IV
Lindsay
McGovern
Jackson
Chisholm
III
McCarthy
Nixon
Paulsen
Wallace
Muskie
Humphrey

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